Vestibular Schwannoma Koos Grade 1

- Hydrocephalus after Gamma Knife Surgery for Vestibular Schwannoma Resolved by Tumor Removal without Cerebrospinal Fluid Diversion: Report of Two Cases
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- A retrospective study demonstrating the growth patterns and the pseudoprogression temporal classification after stereotactic radiosurgery for sporadic vestibular schwannomas
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- Microsurgical outcomes for vestibular schwannomas associated with trigeminal neuralgia
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- Management of treatment-naive Koos grade IV vestibular schwannomas using hypofractionated Gamma Knife radiosurgery: a retrospective single-institution study

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Vestibular Schwannoma Koos grading scale 1 involves only the internal auditory canal without extension into the cerebellopontine angle (CPA).

- These tumors are typically less than 1 cm in diameter.

Clinical features

- They often present with **early symptoms** such as unilateral hearing loss, tinnitus (ringing in the ears), or a sensation of fullness in the ear.

Treatment

Treatment for a Koos Grade 1 vestibular schwannoma is typically aimed at preserving hearing and avoiding damage to surrounding structures.

Common management options include:

1. **Observation** with regular imaging, particularly if the tumor is asymptomatic or if the patient's age and general health suggest that intervention is not immediately necessary.

2. **Surgical resection** to remove the tumor, especially if symptoms are progressive or if the tumor is growing.

3. **Stereotactic radiosurgery** (such as Gamma Knife), which is often used for tumors that are difficult to access surgically or when hearing preservation is a priority.

For Koos Grade I vestibular schwannomas, there is typically no compression of critical structures, and treatment options often involve active surveillance or SRS rather than surgery. These small tumors may not cause immediate symptoms and can often be monitored with regular imaging to track any growth.

Prognosis

The prognosis for Koos Grade 1 vestibular schwannomas is generally good, particularly when they are treated early. However, given the slow-growing nature of many Koos Grade I schwannomas, the necessity and timing of intervention remain topics of ongoing debate in neurosurgery, with individualized treatment being essential

Prospective observational studies

This study by Levivier et al. [1] presents an argument for early intervention with Gamma Knife Surgery (GKS) in patients with Koos grade I vestibular schwannomas (VS), suggesting it as a superior approach to the “wait and see” strategy. However, a critical examination reveals substantial limitations and questions regarding the validity of these recommendations, particularly concerning the study's methodology and interpretation of results.

1. Short Follow-Up Period and Limited Long-Term Data: The mean follow-up in this study was a mere 1.3 years, with a range from 0.6 to 3.6 years, which is alarmingly short given the slow-growing nature of vestibular schwannomas. Tumors in this early stage often exhibit minimal or no growth over years, making this follow-up insufficient to draw conclusions about long-term outcomes, especially in terms of tumor control and cranial nerve preservation. With such limited follow-up, any claims regarding the benefits of early GKS are speculative at best.

2. Lack of Comparison with Observation Group: The study fails to include a direct comparison group of patients managed with observation, which is a common approach for small, asymptomatic, or minimally symptomatic Koos I tumors. Without this essential control, the assertion that early GKS is preferable to a “wait and see” strategy lacks robust evidence. This absence is particularly significant, as previous studies have shown that many Koos I VS can be safely observed without immediate intervention.

3. Inconsistent Hearing Preservation Results and Dose Concerns: The reported hearing preservation rate of 85% appears promising; however, the authors overlook the fact that hearing can often be maintained in Koos I tumors without intervention, as tumor growth rates are typically low. Additionally, the study does not adequately discuss the risks of radiation exposure to the cochlea and the potential for hearing deterioration over time, especially given the mean cochlear dose of 4.1 Gy, which could have cumulative adverse effects.

4. Overstatement of Preliminary Data: The authors prematurely advocate for early GKS based on “preliminary data,” which lacks the rigor and maturity required for such a definitive recommendation. Promoting early intervention based on short-term data may expose patients to unnecessary risks, especially considering that many Koos I tumors remain asymptomatic or progress very slowly. The recommendation for early GKS is therefore premature, and further research with a longer follow-up is essential before suggesting that patients with asymptomatic or minimally symptomatic tumors should

undergo early intervention.

5. Methodological Concerns in Dosimetric Analysis: The study's focus on dosimetric factors, while important, appears overly simplistic in suggesting that cochlear dose alone can predict hearing preservation. Hearing outcomes in VS are multifactorial, and the authors' narrow focus on dose metrics overlooks other critical factors that could influence outcomes, such as baseline hearing quality, individual patient anatomy, and the biological response to radiation.

Conclusion: In summary, this study's recommendation for early GKS in Koos I vestibular schwannomas is founded on weak preliminary data, a limited follow-up, and an absence of a control group for observation. The authors' enthusiasm for early intervention is unwarranted without more robust, long-term evidence. Until such data is available, it would be prudent to adhere to a conservative approach of observation for Koos I tumors, reserving intervention for cases where there is documented tumor progression or symptomatic deterioration.

Retrospective cohort studies

The VISAS-K1 study is a multicenter retrospective analysis comparing stereotactic radiosurgery (SRS) with active surveillance in the management of Koos grade I vestibular schwannomas (VS). The study aimed to evaluate the safety and efficacy of SRS versus observation for these small, intracanalicular tumors.

Study Design and Methods:

Participants: The study included 142 patients with Koos grade I VS, divided into two groups: those who underwent SRS and those who were observed without immediate intervention.

Matching: Propensity score matching was utilized to balance demographics, tumor size, and audiometric data between the two groups, aiming to reduce selection bias.

Follow-up: The median follow-up period was 36 months, with some patients monitored up to 8 years.

Key Findings:

Tumor Control:

The SRS group achieved a 100% tumor control rate at both 5 and 8 years. In contrast, the observation group had control rates of 48.6% at 5 years and 29.5% at 8 years, indicating a significant advantage for SRS in preventing tumor progression. Hearing Preservation:

Preservation of serviceable hearing was comparable between the two groups. At 5 years, 70.1% of patients in the SRS group and 53.4% in the observation group maintained serviceable hearing, with no statistically significant difference (P = .33). Neurological Function:

Patients in the SRS group had a reduced likelihood of developing tinnitus (odds ratio [OR] = 0.46, P = .04), vestibular dysfunction (OR = 0.17, P = .002), and overall cranial nerve dysfunction (OR = 0.49, P = .03) at the last follow-up compared to those under observation. Conclusions:

The VISAS-K1 study suggests that SRS offers superior tumor control and a lower risk of cranial nerve dysfunction for patients with Koos grade I vestibular schwannomas, without compromising hearing preservation, compared to active surveillance. These findings support the consideration of SRS as a

primary treatment option for this patient population [2].

Critical Considerations:

Study Design Limitations: As a retrospective analysis, the study may be subject to selection biases and unmeasured confounding factors, despite efforts to balance groups through propensity score matching.

Follow-up Duration: The median follow-up of 36 months may not fully capture long-term outcomes, especially given the slow-growing nature of vestibular schwannomas.

Outcome Measures: The assessment of cranial nerve function and hearing preservation relies on clinical evaluations that may vary between centers, potentially affecting the consistency of reported outcomes.

In summary, while the VISAS-K1 study provides valuable insights into the management of small vestibular schwannomas, its retrospective nature and potential biases necessitate cautious interpretation of the results. Prospective, randomized controlled trials with standardized outcome assessments are needed to confirm these findings and guide clinical decision-making.

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M. Levivier, C. Tuleasca, Mercy G, Schiappacasse L, M. Zeverino, Maire R. Should Koos grade I vestibular schwannomas be treated early with gamma knife surgery? A subgroup analysis in a series of 190 consecutive patients. Neurochirurgie. 2014;60(6):331-331. doi:https://doi.org/10.1016/j.neuchi.2014.10.028

2)
Bin-Alamer O, Abou-Al-Shaar H, Peker S, Samanci Y, Pelcher I, Begley S, Goenka A, Schulder M, Tourigny JN, Mathieu D, Hamel A, Briggs RG, Yu C, Zada G, Giannotta SL, Speckter H, Palque S, Tripathi M, Kumar S, Kaur R, Kumar N, Rogowski B, Shepard MJ, Johnson BA, Trifiletti DM, Warnick RE, Dayawansa S, Mashiach E, Vasconcellos FN, Bernstein K, Schnurman Z, Alzate J, Kondziolka D, Sheehan JP. Vestibular Schwannoma Koos Grade I International Study of Active Surveillance Versus Stereotactic Radiosurgery: The VISAS-K1 Study. Neurosurgery. 2024 Nov 6. doi: 10.1227/neu.0000000000003215. Epub ahead of print. PMID: 39503441.